WHAT IS CLAIMED IS:

1. A nanowire switching device comprising:

a nanowire structure comprising an elongated member having a cross-sectional diameter ranging from about 1 nanometers but less than about 300 nanometers;

a first terminal coupled to a first portion of the nanowire structure;

a second terminal coupled to a second portion of the nanowire structure, the second portion of the nanowire structure being disposed spatially from the first portion of the nanowire structure; and

an active surface structure coupled to the nanowire structure, the active surface structure extending from the first portion to the second portion along the elongated member, whereupon the nanowire structure has a first electrical value as measured between the first terminal and the second terminal while the active surface is subjected to a first environment, the nanowire structure having a second electrical value as measured between the first terminal and the second terminal while the active surface is subjected to a second environment, the second environment being different from the first environment.

2. The device of claim 1 wherein the device is a switch, a sensor, a chemical sensor, photo-detector, an opto-electonic device, MEMS, MEOMS, and _____.

3. The device of claim 1 wherein the device is a humidity sensor or an oxygen sensor.

4. The device of claim 1 wherein the nanowire structure is characterized by a shape of a nanowire.

5. The device of claim 1 wherein the active surface is about 10% to 90% of a total surface area of the nanowire structure.

6. The device of claim 1 wherein the cross-sectional diameter ranges from about 1 nm to 500 nm.

7. The device of claim 1 wherein the nanowire structure has an aspect ratio (length to diameter) of 10 to 1000.

8. The device of claim 1 wherein the nanowire is made of a material that substantially single crystal.

9. The device of claim 1 wherein the nanowire is made of a material that is polycrystalline.

10. The device of claim 1 wherein the nanowire structure is made of a material that is a semiconductor.

11. The device of claim 10 wherein the semiconductor material is ZnO, SiGe, Si, Ge, SnO_2, GaN, PbSe, PbS, or Bi_2Te_3.

12. The device of claim 1 wherein nanowire structure comprises at least a first material and a second material that are spatially separated from each other.

13. The device of claim 1 wherein the nanowire structure is made of a homogeneous material.

14. The device of claim 1 wherein the nanowire is heterogeneous in texture.

15. The device of claim 1 wherein the second environment comprises an intensity level, the intensity level being proportional to the second electrical value, the second electrical value comprising an electrical current and the second environment comprising electro-magnetic radiation.

16. The device of claim 1 wherein the device is operable at room temperature.

17. The device of claim 1 wherein the device is substantially free from high temperature thermal elements.

18. The device of claim 1 wherein the device is operable at 0 to 100 Degrees Celsius.

19. A method for switching an opto-electronic device, the method comprising:

providing a nanowire structure having a surface region, the surface region having a first chemical species attached to the surface region of the nanowire structure, the nanowire structure having the first chemical species providing a first electrical state of the nanowire structure; and

illuminating energy onto the surface area of the nanowire structure to change the nanowire structure having the first chemical species from the first electrical state to a second electrical state whereupon the second electrical state allows a conduction characteristic of the nanowire to change from the first electrical state to the second electrical state.

20. The method of claim 19 wherein the illuminating releases a portion of the first chemical species from the surface area of the nanowire structure.

21. The method of claim 19 wherein the illuminating converts the first chemical species into the second chemical species.

22. The method of claim 19 wherein the first chemical species can be selected from oxygen, NO_2, H_2O, NO, or SO_2.

23. The method of claim 19 wherein the energy is electro-magnetic radiation.

24. The method of claim 19 wherein the nanowire structure is made of a semiconductor material.

25. The method of claim 24 wherein the semiconductor material is selected from is ZnO, SiGe, Si, Ge, SnO_2, TiO_2, or GaN.

26. The method of claim 19 wherein the nanowire structure is single crystalline or polycrystalline.

27. A nanowire opto-electronic switching device comprising:

a nanowire structure comprising an elongated member having a cross-sectional diameter ranging from about 1 nanometers but less than about 300 nanometers;

a first terminal coupled to a first portion of the nanowire structure;

a second terminal coupled to a second portion of the nanowire structure, the second portion of the nanowire structure being disposed spatially from the first portion of the nanowire structure; and

an active surface structure coupled to the nanowire structure, the active surface structure extending from the first portion to the second portion along the elongated member, whereupon the nanowire structure has a first resistance value as measured between the first terminal and the second terminal while the active surface is subjected to a first level of electro-magnetic radiation, the nanowire structure having a second resistance value as measured between the first terminal and the second terminal while the active surface is subjected to a second level of electro-magnetic radiation.